Systems Integration Program
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Vol. III, No. 1
SIP

Route to:

INPUT Research Bulletin

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A Publication from INPUT's Systems Integration Program

Subcontracting to Client Systems Integrators

The client-managed systems integration market is widely considered to be larger than that of vendor-managed projects. INPUT research suggests that client expenditures for internally managed projects was three times the $4.4 billion spent for vendor projects in 1991. Under favorable conditions this secondary market could grow at a compound annual rate of 15%.

Despite this attention-getting growth, INPUT's survey indicated that an average of only 19% of the internally managed project expenditures go to outside vendors.

Client integrators continue to be skeptical about the use of vendors, and reluctant to give control of critical system changes to outsiders. Vendors have not convinced clients to any significant extent that they can provide better alternatives. And when they do, vendors are generally viewed as being more expensive, except when skills provided are not available internally.

Because client integrators want to minimize subcontracting risks, they prefer vendors with whom they have prior experience, unless they need newer technology or different applications experience. At best, the selection process is based on subjective assessment of vendor capability.

Reasons for Outsourcing

Vendors will be sought by client integrators to participate in their projects for a variety of reasons, as illustrated in Exhibit 1. Respondents closely ranked the first three, with emphasis on maintaining or restoring implementation schedules. This exhibit also compares current and future projects.

Respondents cited staff supplementation as a primary reason for subcontracting. Acquisition of vendor-provided skills also accelerates the implementation of a project. Note, however, that the interviewees expect greater importance to be given to staff supplements and additional skills from vendors on future projects. Implementation acceleration is seen as less important for the future, on the presumption that scheduling will improve with experience.

Internal SI managers, however, do not generally consider the use of subcontractors to be cost effective. This is markedly different from those who outsource their business information processing. It is surprising to see that lower labor costs are expected to become more important in future projects.

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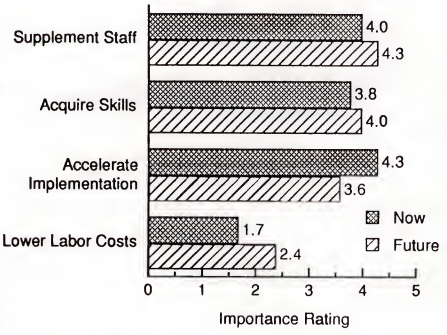
Exhibit 1

Comparison of Reasons for Outsourcing Current vs. Future Projects



Rating: 1 = Low, 5 = High

Source: INPUT

Most SI projects require the acquisition of varying amounts of equipment and software products, generally from outside suppliers, without regard for who manages the projects. Emphasis was placed on professional services tasks in examining the most likely kinds of activity. The relative number of responses for the more significant tasks are displayed in Exhibit 2.

Software development leads because it frequently involves special skills not readily available in most organizations, and at a level less likely to be needed after implementation is completed. Equipment installation is needed where geographic dispersion of distributed systems is involved, and users are not likely to be able to perform the functions. Installation of LANs and client/server systems were identified as subsets needing outside specialists.

Currently, those interviewed generally did not subcontract project management activities. The exception now is for complex replacement systems. Some did indicate consideration of vendor-managers for newer technologies.

Component Expenditure Distribution

Component	Client-managed (Percent)	Vendor-managed (Percent)
Professional Services	55	53
Equipment	30	36
Software Products	15	8
Other Services	—	3

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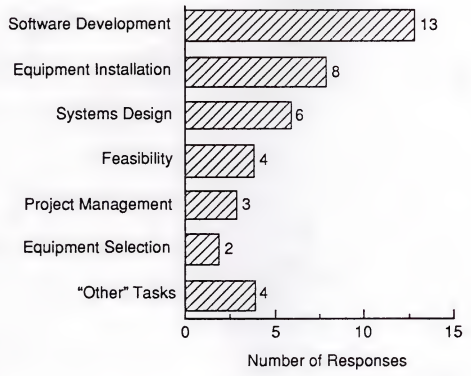
Exhibit 2



and software products vendors gain strong market shares through longstanding client relationships.

Application knowledge and special technical skills have high secondary appeal. Vendors with experience are sought by the client integrator with major integration challenges. Industry knowledge does not appear to be as critical to in-house managers who know their business best and rely on vendors only for specialized, often industry-independent skills.

Some support elements—for feasibility studies, equipment selection and acceptance testing—are employed where the current workload is high.

Subcontractor Selection Criteria

Subcontracting support to client integrators is selected for a variety of reasons, most of which are subjectively assessed. Two-thirds of those interviewed said that the procurement was based on either previous experience of the IS department or recommendations of the user department. Exhibit 3 shows the ratings of the criteria most often used.

Except for special technical skills, the first four criteria clearly illustrate the relative importance of familiarity of the client with the potential vendor. This explains why certain equipment

The most frequently mentioned criterion in the "other" category is training, which might be product-specific, or for special skills on PCs, workstations or data bases.

The last criterion was consistent with INPUT's findings on the reasons for outsourcing—cost is not highly rated. The client integrator is more concerned with completing the project than doing it at the least possible cost.

Subcontracting Vendor Characteristics

One measure of vendor participation in this market is the portion of SI revenues generated in the secondary market. While some vendors do not aggressively pursue secondary opportunities, others consider contracts in this

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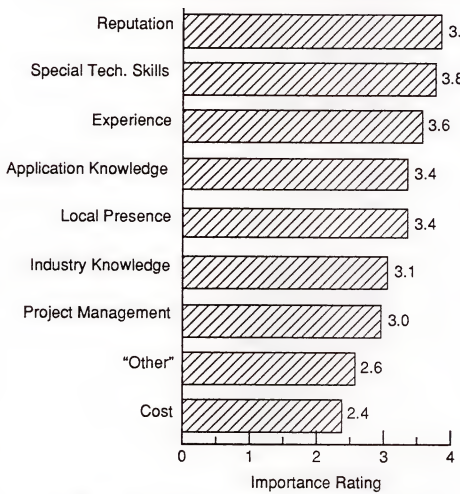
Exhibit 3



market an important part of their total systems integration revenue.

There is insufficient data to identify the market leaders because of definitional problems and the wider range of vendors participating in the market. It is useful, therefore, to classify them in more traditional supplier categories in order to look at strategies and potential revenue contribution from the secondary market. Exhibit 4 lists all but one of the conventional vendor types and revenue ranges that show significant variability of responses.

The unlisted category is equipment manufacturers, who generally leave client integration to VARs or the other vendor types. IBM and DEC are prime examples of vendors who have restructured to address the gamut of systems integration and outsourcing activities, along with a wider range of other information services activities. There is no way at this time to separate subcontracting revenues from the whole of their SI activities.

Full-service vendors, like CSC, EDS and PRC, do not participate aggressively in this secondary market. They will accept engagements where they anticipate future prospective business. This market represents less than 5% of their revenue, so they do not track the subcontracting separately.

The "Big 6" firms generally have a larger consulting and strategy component than do full-service vendors. Respondents indicated that more than 50% of their SI business involves close work with clients, so that much of their revenue is in the secondary market. At least one said that the client is generally responsible for project management.

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Exhibit 4

Vendor Revenue Contribution

Vendor Type	Revenue Range (Percent)
Full service	1 - 2
Big 6	60 - 80
Other professional services	10 - 30
Platform/systems specialists	10 - 15
Applications specialists	20 - 40
Other	20 - 30

Source: INPUT

Other vendors are primarily custom software developers that are being asked to take on SI tasks because of client organization familiarity. Examples include TSC, Keane Associates, Business Systems Group and Lante Corp., all of which have become more active in the secondary market.

Technical specialists are smaller vendors with established niches in the SI market based on implementation of particular platforms or industry applications. They rely on their reputation in the user community to develop new business. Dickens Data Systems, Network Management, Inc. and Evernet are examples of platform/systems specialists. Some of these have or are developing alliances with larger SI vendors. The second class usually has a base of knowledge or a software package specific to an industry or cross-industry function. Policy Management Systems, Information Associates and Decision Focus are typical of this class.

The "other" category includes engineering firms like Fluor Daniel and Harnischfeger, and vendor consortia like U.S. Connect Partners and the "Chicago Six." The latter exemplify an emerging trend of alliances between smaller, regionally based vendors.

Conclusions

Clients still want to exercise control, but need technical skills to satisfy the demands of complex projects. Although significant potential is implied, the market size and specifics are not well defined. Where the need to meet schedules or acquire expert assistance is urgent, users are not cost sensitive.

Vendors can capitalize on technical niches and specialized industry experience. Expansion to national coverage as well as a wider range of available services can come through growth or effective alliances. Building on existing client relationships continues to be a strong strategy.

This Research Bulletin is issued as part of INPUT's Systems Integration Program for the information services industry. If you have questions or comments on this bulletin, please call your local INPUT organization or Alan Nilsen at INPUT, 1953 Gallows Road, Suite 560, Vienna, VA 22182, Telephone (703) 847-6870, Fax (703) 847-6872.

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INPUT provides planning information, analysis, and recommendations for the information technology industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Subscription services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services. INPUT specializes in the software and services industry which includes software products, systems operations, processing services, network services, systems integration, professional services, turnkey systems, and customer services.

Particular areas of expertise include CASE analysis, information systems planning, and outsourcing.

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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Route to:

INPUT Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

Vendors Learn from Successful Integration Contracts

The following is a preview of the research presented in INPUT's new report, *Methods of Successful Systems Integration.*

Vendors surveyed for INPUT's recent study, *Methods of Successful Systems Integration,* report that coming to agreement with their customers (users) on requirements and realistic expectations continues to be the biggest stumbling block in achieving success on a project.

Getting around this obstacle is not always easy, especially when one or both parties view the situation as adversarial.

As shown in Exhibit 1, communication between the vendor and the customer is central to clarifying requirements and building a working relationship between vendor and customer.

For commercial clients, the vendor usually takes on the task of attempting to clarify customer requirements and acceptance criteria. It is to the vendor's advantage to straighten out any misunderstandings of requirements, because a dissatisfied customer may default on the contract.

Conversely, federal contracts tend to be more explicit in defining functional and technical specifications, leaving little room for the vendor to offer alternative solutions.

Exhibit 1

Communication Fosters

- Understanding of customer needs and requirements
- A framework in which to develop mutual trust
- Visibility of cost, schedule and technical performance issues

Mutual trust develops between two parties through repeated exchanges of information. Often vendors want to be included in discussions of their customers' systems problems and business directions. Non-expressed customer agendas and needs become apparent to vendors through frequent interaction. Vendors who achieve a business partner-like status with their customers will improve the likelihood of successful contracts and will build solid reputations.

An atmosphere of mutual trust is also enhanced when communications between the two parties are not restricted to a single point of contact for

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each side. Because of the size and complexity of many systems integration (SI) projects, vendor project teams need direct access to the customer organization, including the ultimate end user. The usefulness of a single point of contact in both the vendor and customer organization is usually limited to contractual issues and signatory authority.

Vendors report that when communication channels are open, it is easy for both sides to bring up and resolve cost, schedule and technical performance issues.

INPUT's research reveals additional lessons learned by vendors (see Exhibit 2).

Exhibit 2

More Lessons

- Avoid fixed-price contracts
- Use formal management tools and processes
- Improve subcontractor management

The majority of buyers and most federal contracting officers prefer fixed-price contracts. This type of contract is usually inappropriate for customers and vendors in the systems integration market. Systems integration is a "service" deliverable, not a commodity item. Obtaining clear requirements and final acceptance criteria from the customer prior to contract award is virtually impossible.

Because SI is a service, changes will occur during the contract's duration. Vendors are restricted in how they respond to customer requests for change when an inflexible fixed-price contract is in place. Ultimately this will affect customer satisfaction with the finished system.

In a fixed-price contract scenario, the vendor bases the proposal on requirements as "they are known." A profit margin is also built into the price proposal. Small changes often add up, and can significantly impact a vendor's profitability and the project schedule. Vendors are refusing to perform SI services under fixed-price conditions because it has become a no-win situation. In the past, vendors often sacrificed profits to keep their customers happy.

Most vendors rely on formal management tools and procedures to control systems integration projects because of the complexity and number of vendor and customer personnel involved in these projects. Vendors advocate using formal risk management and change control procedures. Both techniques minimize surprises for the vendor and the customer throughout the SI process.

Vendors in INPUT's study also stressed the importance of subcontractor management. The Statement of Work (S.O.W.) and the final contract document should clearly delineate the subcontractor's roles, responsibilities and expected measures of achievement. Subcontractors are increasingly required to share the risks assumed by the prime contractor.

How and when communication occurs between vendors and their SI customers has a direct impact on producing a successful contract for both parties. Other issues also play roles in creating an environment geared toward success. Flexible contracts, the use of formal management tools and processes, and the prime contractor's strict control over subcontractors are equally important.

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Route to:

INPUT®
Research
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A Publication from INPUT's U.S. Systems Integration Program

Successful Systems Integrators Tell the World

The most successful systems integrators have corporate initiatives that promote open communication about systems integration programs. There is a direct correlation between the willingness of a company to provide information and that company's success in the SI market. Of course, it does not follow that just having open communication will make a company successful. A company must first have successful SI programs before it can publicize them.

As a result of contacting many systems integration companies for case studies and vendor profile information, INPUT has found a direct correlation between the openness of a company and success in this market. Successful companies take every opportunity to promote their offerings.

In requesting information for case studies for presentation at INPUT's recent systems integration conference, INPUT found that the most successful companies had already synopsized their SI programs for internal use and selective sales/marketing activities. Although the level of detail and orientation of the information varied, the purpose of each company was the same: to inform the market about the company's experience and capability through example. These companies were very willing to share these case studies with INPUT and even with potential competitors who attended the conference.

Conversely, a few companies declined to present case studies for consideration and were not interested in speaking opportunities. These companies were in the distinct minority.

The successful companies use a multipronged attack in accomplishing this communication:

- Media/consultant point of contact—The largest companies have established a point of contact responsible for media relations and providing information to industry consultants. Smaller companies can be successful by including the media/consulting community on their mail lists for annual reports, press releases, analysts' briefings, white papers, etc. Some companies retain public relations firms to help them deliver their message. Even among the smaller companies there are great differences in the provision of information.

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Exhibit 1

IT Industry Associations

• ITAA/ADAPSO	• IEEE
• EIA	• FUGIPI
• ACM	• CBEMA
• CCIA	• AEA
• DPMA	• PSC

Source: INPUT

- Trade associations—The information technology industry, vertical industries and application areas all have allied trade associations. They present opportunities for participation, committee activities, presenting papers and speaking engagements.

- Trade press—The media is continuously seeking qualified authors for articles. There is substantially more benefit in having an article published than in a paid advertisement.

- Management—All management in any company should accept the responsibility to promote that company's activity in the SI markets. There are numerous examples in which the first lead for an SI program came from a casual airplane or dinner conversation. Managers should not overlook briefing their own employees and providing them with summary literature.

- Technical—SI often involves solving technological problems. Promotion of the company's ability to provide those solutions can lead to additional SI engagements.

Technical personnel are notorious for not seeking speaking opportunities or documenting their successes. Encouragement of the technical staff to promote their successes can lead to more business.

The argument against providing information is that it will then become available to a competitor. In today's information society, most of that information is already available to a competitor. A company should consider, if the information were available to a competitor, what realistic adverse action that competitor could take and what the damage could be.

Every company has some information that should be aggressively safeguarded. This policy should be adaptive to each market segment. For example, in some industries client lists are very sensitive. But consider the SI market. It would be very unusual for an SI program to be suspended and awarded to a competitor. If an SI contractor has performed satisfactorily, it is virtually impossible to separate it from an account. There is very little adverse risk in disclosing information about existing or completed programs. Successfully completed programs or programs in process are highly referencable and disclosure will lead to far more business opportunities than negative impacts.

Conversely, proposed programs or those in a study phase are ultra-sensitive and should be jealously guarded. These will become large SI programs in later years and are the plums that every competitor would like to pick.

Some companies that specialize in classified defense SI programs have developed a very secretive corporate culture. These same companies are having difficulty transferring their experiences into commercial opportunities. Although this element of secrecy is only one variable in a complex equation, it certainly adds to the problem.

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In the past, some companies such as Andersen Consulting and EDS would have been included among those with secretive attitudes. Now these same companies have people dedicated to keeping the market informed using the above techniques. IBM and EDS encourage all levels of employees to speak in public forums.

Systems integrators are dependent on subcontractors and alliances to satisfy the complex needs of their clients. Closed companies find it more difficult to establish and maintain these alliances. A secretive company causes concern among its subcontractors. These are truly relationships and communication improves any relationship.

Although some companies do not discourage their employees from promotional activities, they have policies that make it so difficult that most employees decide not to try. Burdensome policies that require all speeches and papers to be written or reviewed at a corporate level or multiple levels of authorization, or require involvement by the public relations department, tend to dampen the enthusiasm of potential participants.

INPUT recommends that SI companies re-examine their own operations to determine if they are effectively promoting their own SI capabilities, experiences and successes. Companies that are not using internal and external resources to pursue all avenues to publicize programs are not realizing the full benefit of their successes.

Mark your Calendar for INPUT's 1992 Conferences!

- Outsourcing Information Systems Program Conference—*Getting Down to the Nuts and Bolts*—will be held September 17 and 18, 1992 at the Ritz-Carlton Hotel in McLean, Virginia.
- 1992 U.S. Executive Conference will be held October 4, 5, and 6, 1992, at the Fairmont Hotel in San Francisco, California.

For more information contact Barbara Fisher, Conference Coordinator, (703) 847-6870.

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Since 1974, INPUT has compiled the most extensive research base available on the worldwide information services market and its key segments, providing detailed market forecasts, vertical industry sector analysis and forecasts and analysis of vendor strategies and products. INPUT delivers specific expertise in the fast changing areas of outsourcing, systems integration, EDI/electronic commerce, software development/CASE, and on the impact of downsizing.

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INPUT® Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

SI Users Match Vendor Program Management Techniques

The following is based on the research presented in INPUT's new report, *Methods of Successful Systems Integration.*

Research conducted by INPUT in early 1992 shows an increase in the involvement of client companies in SI program management. User organizations are now approaching SI contracts from a program management perspective. Previous INPUT studies had shown users in a less involved role, while a contractor performed SI services.

The new posture of users is basically attributed to previous experiences in SI relationships, or the desire of users to have more influence over the final solution.

Users realize that vendors could fail to fashion a satisfactory solution if they receive only specifications from the user organization. Although vendors may have considerable experience in a customer's business, it is difficult for an outsider to develop a custom solution with little input from the client. A client has first-hand knowledge of his industry and company. The vendor needs the customer's participation in the solution.

To help assure that SI contracts are managed to the user's best advantage, 80% of users expect their program managers to have the same or equal qualifications as those of the program manager appointed by the vendor (see Exhibit 1).

Exhibit 1

Customer Program Manager Qualifications

Compared to Vendor's Program Manager	Percent of Respondents
Same	80
Different	13
Don't know	7

Source: INPUT

The customer's program manager oversees the vendor's adherence to the contract. This person is responsible for the customer's interface to the vendor organization, and directly interacts with the vendor's program manager.

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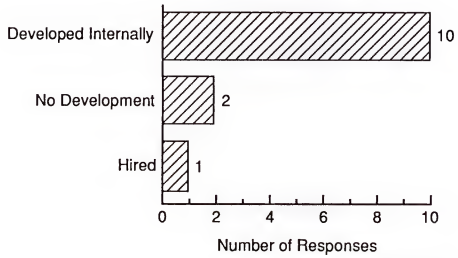
Although users admit it is usually an impossible task to find individuals of program manager caliber within their companies, they rarely hire from the outside, as shown in Exhibit 2

Due to the size and complexity of many SI engagements, it is necessary to have a formal system to track problems and ensure that they are resolved.

Exhibit 2

Customer Program Manager Development Methods



Source: INPUT

User companies are trying to cultivate career paths for individuals who exhibit program manager potential. However, at this time, seminars and on-the-job experience provide the bulk of the preparation given to user program managers.

The formal processes applied by the majority of users in this study to manage their interface with SI contractors are listed in Exhibit 3. Many of these are commonly referred to as risk containment/management procedures.

The user interface organization employs budget controls during the course of an SI contract to monitor the vendor's progress. Careful monitoring of the allocated budget compared to the schedule milestones of deliverables can signal problems in the system when they occur.

As a result of problems and additional requirements, the customer may recommend changes to the solution the vendor is developing. Both organizations establish change management systems to monitor and control changes during the course of an SI contract. Many customers adopt or adapt their vendor's change management process to audit the vendor's change management progress.

Extensive contract administration is usually only necessary if progress payments are included in the contract.

Although education and training components of SI contracts are common, customer organizations are usually involved in providing detailed and ongoing training to end users. Vendors normally develop training materials,

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Exhibit 3

Customer Program Management Procedures

- Budget control
- Problem ID/tracking
- Change control
- Contract administration
- Education of buyer/end users
- Prepare integration plans to existing systems
- Internal quality reviews
- Progress reviews

Source: INPUT

offer initial training services, and train the customers' instructors.

The majority of user organizations in this study also developed plans to integrate the SI deliverable into their existing systems. The SI solutions often incorporate portions of existing systems. In these situations, impacted work flow processes are re-engineered by the user organization.

Customer organizations make their own assessments of the quality and progress of the vendor's developing system. These reviews are considered essential components of SI program management.

Obviously, the scope of an SI contract determines the extent to which customers implement program management procedures. Customers should be ready to modify and initiate procedures as situations evolve.

The path to a successful SI solution is easier when customers monitor vendor processes through their own program management procedures, and work with the vendor toward their common goal.

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INPUT® Research Bulletin

Route to:

A Publication from INPUT's U.S. Systems Integration Program

Courts Integration: Developing a Business Partnership Is the Keystone to Success

The following is adapted from a presentation given by Larry Maloney, Program Manager, IBM Corporation at INPUT's 1992 Systems Integration Conference, July 21, 1992.

IBM Corporation is in the process of completing a statewide case and cash management system for the Administrative Office of the Pennsylvania Courts. The new system connects and integrates the administrative procedures at 540 district justice offices. The resulting information system is designed to mirror how district justices performed their administrative processes manually. Automated processes were non-existent in many of the offices.

Although this project is acclaimed as successful by both IBM and a pleased Pennsylvania Courts System, its implementation is instructive to all systems integrators.

The overall strategy used by the Administrative Office of the Pennsylvania Courts (AOPC) to approach court systems integration is shown in Exhibit 1.

The new court automation system required expeditious case tracking at all judicial levels. This is a typical court system functional automation requirement. In addition, all members of the judiciary needed connection to a network because of the rising complexities of the litigation process. Fragmented systems and "pens and typewriters" do not constitute an efficient administrative environment. All members of a judiciary need to communicate with each other and often track the same cases and individuals.

Exhibit 1

SI Court Systems Master Plan

- Expedite case tracking at all levels
- Connect all judiciary via network
- Interface state and federal agencies
- Enhance office productivity
- Secure public records access

Source: INPUT

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Interfaces were needed to other state and federal agencies, such as the motor vehicle department and revenue collection agencies. The automated tracking of fines and fees is also expected to generate funds to finance the automation of additional court functions.

Obviously, security of court records is vital in a networked environment to safeguard the individual rights of defendants and expedite tracking of offenders.

As most systems integrators know, problems are encountered that potentially can jeopardize the completion schedule and budget. Some of the problems encountered on the Pennsylvania District Court contract are listed in Exhibit 2. They are common to many SI projects.

Exhibit 2

Problems Encountered

- Vendor and customer culture clash
- One subcontractor went bankrupt
- Failure of a subcontractor to deliver component backup system
- Essential hardware not approved by Underwriters' Laboratories
- Incomplete design
- Insufficient time allowed for change following pilot systems
- Performance criteria not suitable
- Customer underestimated data usage

Source: INPUT

When vendors and customers work together at the customer's site it is not uncommon for a culture clash to develop between them. Vendor personnel are accustomed to working in their corporate environment, which invariably functions differently than the environment of the client. Procedures and expectations are different.

Bankruptcy of a subcontractor is occurring more frequently. Small niche service or product subcontractors are increasingly going out of business as a result of the U.S. economic downturn.

A subcontractor may also fail to meet budget and time schedules due to any number of factors, such as poor project management, or a lack of financial and people resources.

If key hardware does not have Underwriters' Laboratories approval, the length of the approval process may have a significant impact on the contract's delivery schedule.

An incomplete design causes customer distrust of the vendor. However, incomplete designs are often the result of unknown or incomplete specifications from the customer.

It is the integrator's responsibility to ensure that specifications are complete, and to obtain written agreement from the customer on specifications. Without this agreement, it is difficult for the vendor to develop an accurate schedule.

Contracts usually spell out acceptable performance criteria expected from deliverables. If the performance criteria are too explicit, the vendor is limited in

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the type of final solution that can be delivered. The vendor needs flexibility to adapt to unfolding requirements and the problems inherent in systems development. Ultimately the users will not be satisfied with a system that is not reflective of their needs.

Underestimates of data usage can significantly impact the pricing, schedule, and software and hardware requirements of an SI solution.

The key lessons learned by IBM that can be applied to future SI contracts are shown in Exhibit 3.

IBM's culture clash with the Pennsylvania Courts was eased by building a relationship based on mutual trust. This process is not accomplished in a day, but by repeated interchanges and the vendor's demonstration of professionalism and genuine interest in providing a satisfactory solution. Working with end users through each step of the process is essential. This approach helps to develop a partnership with the customer. Customers do not necessarily believe that vendors are on their side. Often in SI relationships the customer views the vendor as an adversary. It is up to the vendor to take the necessary steps to correct this perception, and help build a joint partnership with the customer.

The ultimate success of the contract depends on a working and flexible relationship between the two parties. Issues regarding performance criteria, milestone dates and requirements will invariably surface and need to be resolved.

Exhibit 3

Lessons Learned

- Build and keep customer's trust
- Develop partnership with customer
- Provide full-time project management for each key area
- Agree on management tools
- Agree on change control procedures
- Develop quality standards for all parties involved
- Qualify subcontractors financially
- Qualify subcontractors technically
- Qualify subcontractors' project management skills
- Ensure that subcontractors are financially committed to performance criteria
- Have contingency plans for all subcontractors
- Maintain the right to remove any person or subcontractor
- Ensure that all equipment meets standards
- Do a gradual turnover of key processes
- Keep all vendor personnel at one location

Source: INPUT

Another way a vendor eases culture clashes is by demonstrating project management skills to the customer. In addition, obtaining customer agreement on management and change control procedures will help cement the working relationship.

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The vendor must also develop quality standards for his organization and subcontractors with specific measurements and tools identified.

An experienced SI contractor will guard against subcontractor mismanagement or failure. Subcontractors should be qualified financially and technically. A subcontractor's references should be checked to verify technical capabilities. Investigation of subcontractors' project control procedures should be performed. Subcontractors that make a financial commitment to meet performance criteria, usually do.

The SI contractor should reserve the right to replace any subcontractor or person involved in a project for non-performance. Backup subcontractors and internal staffers should always be kept in mind.

Selection of equipment that meets approved industry standards helps meet schedule commitments. Additional risk is inherent in selecting modified or newly developed equipment.

Development of a plan delineating how and when the transition of deliverables, including project control, will occur is essential to assuring customer acceptance. A gradual turnover of processes to the customer allows time for education, and re-education on automated work processes.

For large SI engagements in particular, it is easier for the SI contractor to manage a diverse staff and the staffs of subcontractors if everyone is contained in one location. Communication is facilitated, and project management procedures are easier to implement.

1992 U.S. Executive Conference will be held November 1, 2, and 3, 1992, at the Fairmont Hotel in San Francisco, California.

For more information contact Glenna Nathans at (415) 961-3300.

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Route to:

INPUT® Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

Software Factory Drives Successful SI Program

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Participants at INPUT's SI conference heard how a system integrator uses manufacturing techniques to improve productivity of SI programs. Mr. Charles N. Gregory, Senior Vice President of Atkinson, Tremblay & Assoc. (ATA) Inc., described the process at INPUT's annual SI conference.

ATA is the Canadian affiliate of AGS/NYNEX. The ATA case study focused on the development of an integrated client account servicing system for a leading Canadian distributor of mutual funds and investment services.

ATA utilizes advanced manufacturing techniques in its Software Factory to undertake development of custom business software systems in SI projects. The Software Factory environment consists of small super teams of four or five people, fully responsible for developing and testing their components. Similar subassembly and assembly teams test and deliver the final system.

Mr. Gregory identified two critical success factors for remaining a leader in the financial investment services marketplace in today's climate of deregulation and increased competition. These factors were the rapid introduction of new products and services and improved customer service through offering integrated portfolio management. Constraints on achieving these critical success factors lay in the existing information systems. They are often old, rigid, and fragmented. The primary SI program objectives are shown in Exhibit 1.

Exhibit 1

SI Program Objectives

- Introduce financial products and services rapidly
- Improve customer service
- Improve management information
- Renew technology platform

Source: INPUT

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The systems environment of the client cited in this case study was characterized by multiple parallel systems developed over the years using various technologies to support individual financial products and services. The client had frequently been forced into the trap of introducing new automated systems to support new financial products. As a result, there were many functional redundancies and inconsistencies in the customer service information systems. Duplicate functionality existed throughout the current systems, which made them hard to maintain and test.

ATA did not want to build a new system using new technology. Rather, ATA's objective was to ensure that the new integrated system met current and future business requirements. The approach was to build a smaller system that was flexible, consistent and accurate, yet would apply to all areas of client service operations.

The ATA program focused on automating the fundamental concepts of the business that are stable and independent of today's organization. The development methodology used by ATA is based on taking the concepts, as identified in the architecture phase, and automating them as discrete functional components that are generic and independent of a procedural, circumstantial view of the business. Each discrete functional component, including the user interface, can be built and tested on its own.

The ATA process, "Concept-ing™," is the formulation of concepts that are generic and stable. The goal of "Concept-ing" is to find the ideal set of concepts among which, for any business procedure, some combination will automate the procedure. Assembly and integration of the system consists only of enabling and validating the links between the components.

The two areas of benefits that stand out in the ATA development program are:

- *The type of software system delivered*—The generic design allows users to operate all parts of the system, thus eliminating the requirement for dedicated, specialized operators.

- *The use of a manufacturing approach*—Because each functional component is unique and complete in itself, it may be built on its own by a dedicated team. As in a manufacturing shop, finished software components are passed forward to the steps of subassembly and final assembly, with testing at each step.

ATA's Software Factory approach has been set up to take on custom projects for clients seeking to re-engineer their business operations. Although the factory approach has been around for about twenty years, it is still a controversial subject. In this case study, the factory approach has been successful. Success has been achieved in streamlining the software development process with high levels of productivity, re-utilization of code, and quality software. In addition, the system permits simplifying business operations due to the improved design approach.

By defining a clear goal and continually refining the strategy to reach that goal, ATA was able to deliver the system without having to stop and redo any portion of the new system. Exhibit 2 details the main benefits attained in the SI program.

The end result was a system that, according to industry standards, would be classed as very large—over 8,000 function points. Quality,

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Exhibit 2

SI Program Benefits

- Simplification of business operations
- Independence of software from user procedures
- Design of software not circumstantial
- Separation of system functions from user interface
- High level of re-utilization of software components (70%-80%)
- Quality of software—over 97% defect removal

Source: INPUT

productivity, and performance of the new system all improved greatly throughout the project. ATA was able to increase the function points per person-month in each successive version of the system. This is an extraordinary accomplishment because the tasks at the end of an integration program are usually the most difficult to complete.

By using a manufacturing-type approach ATA is able to measure and improve metrics such as functional points per person-month, defect removal rates, and percentage of software reused. This is fundamental to the total quality improvement process and provides ATA with a powerful tool to effectively improve the client's system performance.

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Route to:

INPUT® Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

The Lagging Economy Hits SI Growth

The prolonged economic slowdown has negatively affected the potential growth rate of systems integration (SI) programs. Faced with a sluggish business environment and an uncertain future, some buyers are delaying the start of large SI programs. Others are adapting to smaller, more modular approaches with lower initial investment and faster payback. The slow economy has increased competitive pressures for most companies. These pressures are forcing companies to focus on their core business and added value.

Many companies are using technology to gain competitive advantage by reducing costs, providing superior service, expediting product development, and improving quality and productivity. These new solutions are becoming increasingly complex as they facilitate new business processes and serve new organizational structures. In most cases, companies do not have the internal skills necessary to design and implement these systems. Exhibit 1 synopsizes the major 1992 buyer issues.

Exhibit 1

Buyer Issues—1992

- The economy
- Core business functions
- Competitive demands
- Increasingly complex solutions
- New technology applications
- Unavailable skills

Source: INPUT

An increasing amount of information systems expenditures are no longer exclusively controlled by the internal information systems organizations. In many cases the user organizations are demanding and funding their own systems. The decision to use an outside vendor to provide systems integration services has become more of a business issue and less of an information systems issue.

Many of the solutions that users need include new technologies such as artificial intelligence, image processing, downsized systems, and a wide variety of advanced telecommunications

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alternatives such as LANs, MANs, and WANs. System integrators with a good track record provide an attractive alternative to internal information systems organizations that lack adequate resources and skills to meet new user requirements. Some internal organizations also lack the applications knowledge and experience in new technologies that is required.

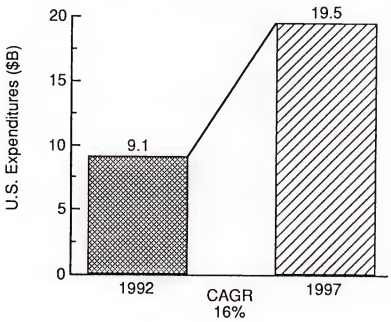
Exhibit 2 shows the systems integration forecast for 1992-1997.

The federal government component continues to decline as a percentage of the total and will represent $3.7 billion in 1992 growing to $6.4 billion in 1997, a CAGR of 12%. The commercial segment will grow from $5.4 billion in 1992 to $13.1 billion in 1997, a CAGR of 19%.

The second largest vertical market is discrete manufacturing. INPUT forecasts this market to grow from $1.3 billion in 1992 to $3.5 billion in 1997. This growth rate of 21% is slightly lower that the one previously forecasted, but still represents exceptional opportunity.

Exhibit 2

Systems Integration Market



Source: INPUT

In 1991 companies actually invested 1% less in industrial plant and equipment than in 1990. With inflation under 4%, the forecasted growth rate of 16% still represents a healthy 12% real growth. INPUT expects the systems integration market to grow from $9.1 billion in 1992 to $19.5 billion in 1997.

Shifts in project size and project value and the impact of technological and economic pressures has brought the forecast for the SI market more

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in line with the overall growth of the information services industry, at least for the short term.

In the long term, INPUT expects the systems integration market to rebound and outpace the overall market, but significant changes should not be expected until economic confidence has been restored and companies are more disposed to make additional investments. This forecast, more so than in the past, is highly dependent upon, and sensitive to, economic conditions.

The SI market varies greatly by vertical industry. The federal sector was the leader in the industry. But the budget deficit, defense cuts, and shifting priorities have all led to reduced growth in this market segment. The attractiveness of other vertical industries is directly proportional to how much they have been affected by the current economic situation.

Vendors recognize the importance of understanding their client's business, particularly in an environment where long-term relationships are important. To achieve this goal, SI vendors are making significant investments in industry-specific architectures and solutions, hiring industry experts, and establishing alliances with consulting firms or professional service firms that have industry expertise.

The larger vendors that already have industry coverage have established goals to broaden their SI vertical industry coverage to protect their existing customer relationships. Smaller vendors are honing niche skills and gaining market coverage through alliances with larger vendors who seek these specialized vertical industry skills.

A growing number of secondary vendors are seeking participation in vertical markets. Many have products that were previously sold as standalone systems but are now candidates for integration into larger solutions. These products include basic computing equipment as well as robots, intelligent material handling equipment, on-board computers, and a variety of communications products. Other secondary vendors seeking SI participation include companies that have developed solutions internally and want to market these skills and capabilities to others in their industry.

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The Evolution of Technology in a Long-Term Contract

How do you automate a manual system that contains 130 million pages of paper representing 14.5 million patents when new applications are coming in at the rate of 3,300 per week ? How do you catalog a set of documents that contain text, photographs, diagrams, and calculations and make them accessible to patent examiners and the general public at remote sites as well?

These were only a few of the questions faced by PRC in 1984 when they were selected to automate the Patent and Trade Mark Office's (PTO's) "shoe box" system for patent search and retrieval. Jim Merrell, vice president and executive director at PRC, now part of Black and Decker, presented the current status of this project at INPUT's Systems Integration Conference held in Vienna, VA, in July.

This contract, originally valued at $450 million over a 10-year life cycle, has now been in place for 6 years. There are currently 200 PRC people assigned to the contract. It was a good time to look back at what had been accomplished and understand how the challenges had been managed.

More Facts

The magnitude of the challenge can be further illustrated by looking at other facts in the case. Exhibit 1 summarizes some of the data associated with the PTO patent system.

Exhibit 1

The Magnitude of the Problem

- 130 million pages of paper
- 14.5 million U.S. patents in the system
- 175,000 patent applications per year
- 3,300 new patent applications arrive weekly
- 2,000 new patents awarded each week

Source: INPUT

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The numbers are staggering. The 14.5 million existing U.S. patents vary in size from 1 to 1,000 pages and include photos, diagrams, and statistics as well as text. The large docket of pending patents is being augmented weekly by 3,300 new applications. Not all applications are granted, so the 2,000 patents awarded each week will eventually reduce the outstanding applications backlog. The access issue is another challenge since the patent examiners need to access the data from regional offices across the country and the PTO is committed to also providing additional sites for public access to the patent data base.

Change Can Be Evolutionary

The magnitude of the numbers is only one aspect of the challenge PRC faced. Since the project involved an ongoing function critical to the agency, the changes had to be incorporated incrementally lest they disrupt an ongoing system that supported the primary mission of the agency.

The initial contract was not a so-called grand design award but rather one designed to take advantage of incremental technology changes. It was based on technology available in 1984, open systems built with UNIX operating in a PC platform environment. Jim Merrell commented that even that approach was "rather sporty" at the time. This design model produced some results, but the project schedule began to slip and cost overruns began to appear.

In 1988, a different development model was adopted after much analysis and discussion between PRC and agency representatives. The deployment was redesigned along an incremental model. As a piece of the system was developed, it was turned over to a limited set of users as a production model. The further insertion of technology into the organization was based on the feedback from these prototype users.

To make such a management model work, a task order implementation methodology was adopted. The entire project was redefined into small pieces, each of which could be developed, implemented, and deployed in manageable segments. This provided for a much more confining operating environment for the vendor, but one that could be tightly controlled. As a result, the project is now on schedule and back within budget, according to Jim Merrell.

To deal effectively with technical issues under this task order model, PRC adopted what Jim described as a "two-headed organization." An Implementation Group is in place to execute task orders as defined. They develop and deliver modules of the system on a schedule developed jointly by PRC and the agency. Another group, known as the Systems Architecture Group, is in place also. Though much smaller, this group's role is to regularly question the Implementation Group's approach to ensure the latest technology enhancements have been introduced. In effect, there is a constant re-engineering activity going on. Exhibit 2 illustrates the concept.

Exhibit 2

PRC's Two-Headed Organization

Implementation	Systems Architecture
- Develop system	- Review designs
- Deliver capability	- Question process
- Task orders	

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This system creates a healthy level of tension, according to Jim, one that ensures that everyone is "looking at the forest and not the trees." The vendor has a clear picture of expectations and the client has a good measure of control over the results. There are fewer surprises for either party.

Jim indicated that this project is back on schedule and within budget because of this approach. Smaller, more manageable tasks lend themselves to more predictable results. The emergence of shorter projects in the commercial SI world are some indication that this management philosophy also works in that marketplace.

Leveraging Experience

PRC has gained a lot of management and technical experience from this long-term project. The company's willingness to face the challenges inherent in the contract in 1984 has been productive for them. The issue of whether it also has been profitable was not addressed by Jim. As with many of these long-term contracts, it becomes harder to measure profitability as the project wavers from overrun status back to within budget.

PRC has leveraged the experience it gained on this contract into other opportunities, becoming a recognized vendor of choice in the digital imaging technology arena. The company is heavily involved in both the Navy's EDMICS and the Army's PERMS contracts, both of which have high digital imaging technology requirements. They have developed a demonstrable telecommunications capability, having just converted the PTOnet architecture to a fiber backbone network this year.

It is only good management practice to capitalize on opportunities as they occur. Often the long-range benefits of new experience acquired by an organization outweigh the immediate benefits of the contract itself.

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Route to:

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BT Customer Systems—Becoming a Global Leader in Systems Integration

BT Customer Systems with total revenues of approximately £200 million in 1991 has been described as the largest U.K.-owned supplier of computing services. The company, formed from a large number of individual BT profit centres in 1990, is particularly active in the systems integration market. Throughout its existence, BT Customer Systems has emphasized its desire to be the prime contractor for large, complex projects.

BT Customer Systems now intends to develop into a truly international business and to become one of the leading five vendors worldwide in its chosen markets within five years.

Despite its apparent size, BT Customer Systems has considerable scope to further develop its presence in the systems integration market. Roughly a third of the company's revenues are derived from captive business and over half of the remainder comes from the company's strong position in the public sector. The company's activities are also strongly concentrated in the U.K.

BT Customer Systems' objectives are being addressed by the following strategies:

- Adopting a strong market focus
- Changing its image
- Forming appropriate partnerships.

Targeting Communications-Intensive Activities

Exhibit 1 provides a number of examples of projects undertaken by BT Customer Systems. It can be seen that these projects reflect BT Customer System's advanced network integration capabilities. Historically, the majority of the company's projects have been network integration projects.

The company's current market foci also reflect its targeting of communications-intensive applications. These foci are

- Solutions related to the interfaces between enterprises, their customers, and their partners, for example,
  - Voice response systems
  - EDI
  - Telemarketing
- Systems that support new organizational structures or cultures, for example,
  - Teleworking systems
  - Corporate messaging/office automation systems
  - Change management consultancy

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Exhibit 1

Typical Projects
BT Customer Systems

Client	Nature of Project
ICI	Global communications infrastructure
BP	Emergency control center
Mercantile Credit	Network integration between credit reference agency, mainframe, and dealer workstations
Department of Social Security	Strategy Terminal Systems program
HM Customs and Excise	Customs handling of import and export freight
Digital	Telemarketing system

Source: INPUT

- Systems that assist enterprises in delivering service to their customers, for example,

  - Document image processing
  - Home banking systems
  - Retailing systems.

The principal industries being targeted by BT Customer Systems are

- Banking and finance
- Government—both civil and defence
- Transportation
- Manufacturing.

The company has its own products for the banking sector. These are packaged under the identities Integrated Trading Systems (ITS) and Open Trading Systems (OTS). ITS encompasses switches and dealer boards, whereas OTS provides distribution of data in video or digital form. BT Customer Systems has also developed an advanced cargo processing system for use by airlines, freight forwarders, and customs authorities.

BT Customer Systems views coordination between elements of the "extended enterprise" as a major opportunity within the manufacturing sector.

Overall, BT Customer Systems should be favored by the increasing adoption of client/server architectures necessitating a greater communications emphasis, and by its own increasing emphasis on business solutions, which provide competitive advantage to their user organizations.

Development of Its Corporate Image

So far, BT Customer Systems has adopted a comparatively low profile in the systems integration market. However, this is going to change. One of the first steps will be a change in company name to reflect more accurately the company's market positioning.

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BT Customer Systems will also endeavor to expand its business skills, building on its depth of technical expertise, to offer business process re-engineering and change management capability. The company perceives that these skills are now vital to ensure that its clients realize the benefits from new information systems. As the skill mix begins to change, so BT Customer Systems may in the future begin to subcontract skills of low-perceived value to the customer, such as programming, allowing the company to concentrate more of its resources on delivering improved business processes to its clients.

Forming Partnerships

Though BT Customer Systems intends to develop its own skills in business process re-engineering and change management, it may need to use partners to supplement its own skills in these areas in the short term. Other areas where the company will need partners are in developing its global market coverage and in obtaining access to advanced technology.

BT already has office locations worldwide and BT Customer Systems will increasingly deploy its own personnel within this infrastructure. However the company will also speed up this process by means of acquisitions should suitable companies become available.

BT Customer Systems has expertise in two important business process re-engineering technologies, namely, telemarketing and image processing. In these areas, the company has developed relationships with a number of suppliers to gain access to a range of products, ensuring that BT Customer Systems does not become tied to a specific platform.

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